

**WHAT IS CLAIMED:**

1           1. A method for etching a tapered trench in a layer of material, said layer of  
2           material having a mask adjacent a surface thereof which has an opening therein defining a  
3           location on the layer of material at which the trench is to be formed, said method comprising:

- 4           a. performing a vertical etch process step on said layer of material;  
5           b. enlarging the opening in said mask; and  
6           c. repeating steps a and b above in an alternating manner until a trench has been  
7           etched to a desired depth.

1           2. The method according to Claim 1, wherein said mask comprises a resist layer,  
2           and wherein said enlarging step comprises performing a resist etch process step to enlarge  
3           the opening in said resist layer.

1           3. The method according to Claim 2, wherein the resist layer is tapered around  
2           a periphery of said opening to facilitate the resist etch process step.

1           4. The method according to Claim 2, wherein said vertical etch process steps and  
2           said resist etch process steps are performed in a multi step process.

1           5. The method according to Claim 2, wherein said vertical etch process steps and  
2           said resist etch process steps are performed in a pulsed etch process.

1           6. The method according to Claim 1, wherein said trench has a depth of from  
2           about 10um to about 100um.

1           7. The method according to Claim 6, wherein said trench has sidewalls tapered  
2           at a slope of from about 45 degrees to about 80 degrees.

1           8. The method according to Claim 1, wherein said layer of material comprises  
2           a semiconductor substrate.

1           9. The method according to Claim 8, wherein said semiconductor substrate  
2           comprises a silicon substrate.

1           10. The method according to Claim 1, and further including the step of  
2           performing a metal deposition step in said trench when said trench has been etched to a  
3           desired depth.

1           11. The method according to Claim 1, wherein said method is incorporated into  
2 a process for fabricating a MEMS device.

1           12. The method according to Claim 1, wherein said method is incorporated in a  
2 process for fabricating a high power RF device including a LDMOS and a VDMOS device.

1           13. The method according to Claim 1, wherein said method is incorporated in a  
2 process for fabricating a Z-axis accelerometer.

1           14. The method according to Claim 1, including the steps of independently  
2 controlling one or more of pressure, power, gas flows and time duration during the vertical  
3 etch process steps.

- 1           15. A method for etching a tapered trench extending into a substrate from a  
2 surface thereof, said method comprising:
- 3               a. providing a mask adjacent said surface, said mask having an opening defining  
4 a location on said substrate at which said trench is to be etched;
- 5               b. performing a first vertical etch process step to form a first trench portion at  
6 said location;
- 7               c. performing a first opening enlarging step for enlarging the opening in said  
8 mask;
- 9               d. performing a second vertical etch process step to form a second trench  
10 portion;
- 11              e. performing a second opening enlarging step for further enlarging the opening  
12 in said mask; and
- 13              f. continuing to perform vertical etch process steps and opening enlarging  
14 process steps in an alternating manner until said trench is of a desired depth.

- 1           16. The method according to Claim 15, wherein said mask comprises a resist  
2 layer, and wherein said opening enlarging steps comprise performing resist etch process steps  
3 to enlarge the opening in said resist layer.

1           17. The method according to Claim 16, and further including the step of tapering  
2         said resist layer around a periphery of said opening prior to performing the first vertical etch  
3         process step to facilitate performing the resist etch process steps.

1           18. The method according to Claim 15, wherein said trench has a depth of from  
2         about 10um or less to about 100um or more.

1           19. The method according to Claim 18, wherein sidewalls of said trench have a  
2         slope of from about 45 degrees to about 80 degrees.

1           20. An apparatus for etching a tapered trench in a layer of material, said layer of  
2 material having a mask adjacent a surface thereof having an opening defining a location on  
3 the layer of material at which the trench is to be formed, said apparatus comprising:

4                 an etching tool for performing vertical etch process steps on said layer of material;  
5 and

6                 an opening enlarging tool for performing steps of enlarging said opening in said  
7 mask, said etching tool and said opening enlarging tool operating in an alternating manner  
8 to form a trench of a desired depth in said layer of material.

1           21. The apparatus according to Claim 20, wherein said mask comprises a resist  
2 layer, and wherein said mask opening enlarging tool comprises a tool for performing resist  
3 etch process steps on said resist layer.

1           22. The apparatus according to Claim 21, wherein said resist layer is tapered  
2 around the periphery of said opening to facilitate performing of the resist etch process steps.

1           23. The apparatus according to Claim 21, wherein said vertical etch process tool  
2 and said resist etch process tool are incorporated in a tool that operates in a pulsed manner.

1                   24. The apparatus according to Claim 21, wherein said vertical etch process tool  
2 and said resist etch process tool are incorporated in a tool that operates in a multi step  
3 manner.